

**FORT ROSECRANS NATIONAL CEMETERY ANNEX
AT MCAS MIRAMAR**

WETLAND RESTORATION PLAN

February 1, 2010

Prepared for :

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NATIONAL CEMETERY ADMINISTRATION
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Wetland Restoration Plan**

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
I.	INTRODUCTION.....	1
II.	PROJECT DESCRIPTION.....	1
	A. Project Location	1
	B. Project Description.....	1
	C. Jurisdictional Impacts	1
	D. Mitigation Requirements	2
III.	MITIGATION SITE DESCRIPTION.....	3
	A. Mitigation Location.....	3
	B. Environmental Setting	3
	C. Existing Functions and Services	3
	D. Mitigation Site Suitability.....	4
IV.	MITIGATION DESIGN CONCEPT	4
	A. Mitigation Design	4
	B. Target Functions and Services	6
	C. Rationale for Expecting Implementation Success	6
V.	PROJECT RESPONSIBILITY	6
	A. Responsible Party(ies).....	6
	B. Restoration Specialist.....	7
	C. Landscape Architect.....	7
	D. Grading Contractor	7
	E. Installation/Maintenance Contractor.....	7
VI.	MITIGATION INSTALLATION	8
	A. Installation Schedule	8
	B. Plant and Seed Orders.....	8
	C. Document Pre-impact Conditions.....	9
	D. Pre-construction Meeting.....	9
	E. Mitigation Site Fencing.....	9
	F. Grading/Non-native Plant Removal.....	9
	G. Irrigation.....	10
	H. Plant and Seed Installation.....	10
	I. As-built Conditions.....	12

TABLE OF CONTENTS (cont.)

<u>Section</u>	<u>Title</u>	<u>Page</u>
VII.	MAINTENANCE PLAN	12
A.	Maintenance Activities	12
1.	General Maintenance	12
2.	Non-native Plant Control	12
3.	Irrigation.....	13
4.	Other Pests	13
5.	Fertilization	13
6.	Pruning.....	13
B.	Maintenance Schedule	14
VIII.	MONITORING PLAN.....	14
A.	Pre-construction Monitoring.....	14
B.	Installation Monitoring	15
C.	Maintenance Monitoring.....	15
D.	Technical Monitoring.....	15
1.	Vegetation Monitoring.....	16
2.	Target Functions and Services Monitoring.....	16
3.	Photo Documentation.....	17
4.	Annual Reports	17
IX.	SUCCESS CRITERIA.....	17
A.	90-day Establishment Period	17
B.	Vegetation Criteria.....	18
1.	Survivorship.....	18
2.	Native Cover	18
3.	Non-native Cover.....	19
4.	Species Richness and Recruitment	19
C.	Target Functions and Services Criteria.....	19
1.	Hydrological.....	19
2.	Biogeochemical.....	20
3.	Biological.....	21
D.	Irrigation Criterion	21
X.	COMPLETION OF MITIGATION	21
A.	Notification of Completion.....	21
B.	Confirmation	21
XI.	CONTINGENCY MEASURES	21
A.	Initiating Procedures	21
B.	Alternative Locations for Contingency Mitigation	21

TABLE OF CONTENTS (cont.)

<u>Section</u>	<u>Title</u>	<u>Page</u>
XII.	CERTIFICATION/QUALIFICATION.....	22
XIII.	REFERENCES	23

LIST OF FIGURES

<u>Number</u>	<u>Title</u>	<u>Follows Page</u>
1	Regional Location Map.....	2
2	Project Location Map.....	2
3	Area 1 – Wetland Mitigation	4
4	Area 2 – Wetland Mitigation	4

LIST OF TABLES

<u>Number</u>	<u>Title</u>	<u>Page</u>
1	Corps Jurisdictional Impacts.....	2
2	Wetland Mitigation Requirements.....	2
3	Proposed Wetland Mitigation	5
4	Southern Willow Scrub and Baccharis Scrub Seed Mix	10
5	Southern Willow Scrub Container Plant Palette.....	11
6	Baccharis Scrub Container Plant Palette.....	11
7	Maintenance Schedule	14
8	Maintenance Monitoring Schedule.....	15
9	Vegetative Cover Success Criteria.....	18
10	HGM Success Criteria	20

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I. INTRODUCTION

This report provides a restoration plan for impacts to U.S. Army Corps of Engineers (Corps) jurisdictional Waters of the U.S. (WUS) resulting from implementation of the Fort Rosecrans National Cemetery Annex (proposed project) at Marine Corps Air Station (MCAS) Miramar. This plan only addresses mitigation for the project's effects on WUS other than vernal pools and road ruts. Compensatory mitigation for the project's effects on vernal pools and road ruts is presented in a separate report (HELIX Environmental Planning, Inc. [HELIX] 2009).

II. PROJECT DESCRIPTION

A. PROJECT LOCATION

The 313-acre proposed project site is located on MCAS Miramar in the northern portion of the City of San Diego, north of California State Route 52, and east of Interstate 805 (Figure 1); it is within unsectioned lands in Township 15 South, Range 3 West of the U.S. Geological Survey 7.5-minute Del Mar and La Jolla quadrangle maps (Figure 2). Specifically, the site is located 13 miles north of downtown San Diego and approximately 12 miles northeast of the existing Fort Rosecrans National Cemetery and is bordered on the north by Miramar Road, on the west by Interstate 805 and Nobel Drive, and to the southeast by the North County Transit District rail corridor. The project site is within the coastal plain of San Diego County and is positioned directly north of Rose Canyon. Elevations within the site range from approximately 258 feet above mean sea level (AMSL) in the southern tip of the site to 406 feet AMSL in the northeastern corner.

B. PROJECT DESCRIPTION

The purpose of the proposed project is to provide needed burial space for military veterans and their eligible dependents in the San Diego area by constructing an annex to the existing Fort Rosecrans National Cemetery at Point Loma in San Diego, California. Since no additional land is available for expansion at Fort Rosecrans or at Naval Base Point Loma, the annex will be located at MCAS Miramar.

The cemetery occupies a portion of a 313-acre parcel of federally owned land. The Final Environmental Impact Statement (FEIS; EDAW 2007) for the project identifies an approximately 214-acre approved project footprint within which all cemetery development and operations are to occur. The cemetery will be constructed in phases and the actual development boundary may change over time as the different phases of development proceed to construction; however, cemetery development will never exceed the approved project footprint. As a result of a master planning effort, proposed cemetery development would occupy approximately 144 acres of the 214-acre approved project footprint.

C. JURISDICTIONAL IMPACTS

The proposed project would impact a total of 0.25 acre of Corps jurisdictional areas, including wetland WUS consisting of 0.01 acre of emergent wetland (EMW) and 0.24 acre of ephemeral non-wetland WUS (Table 1).

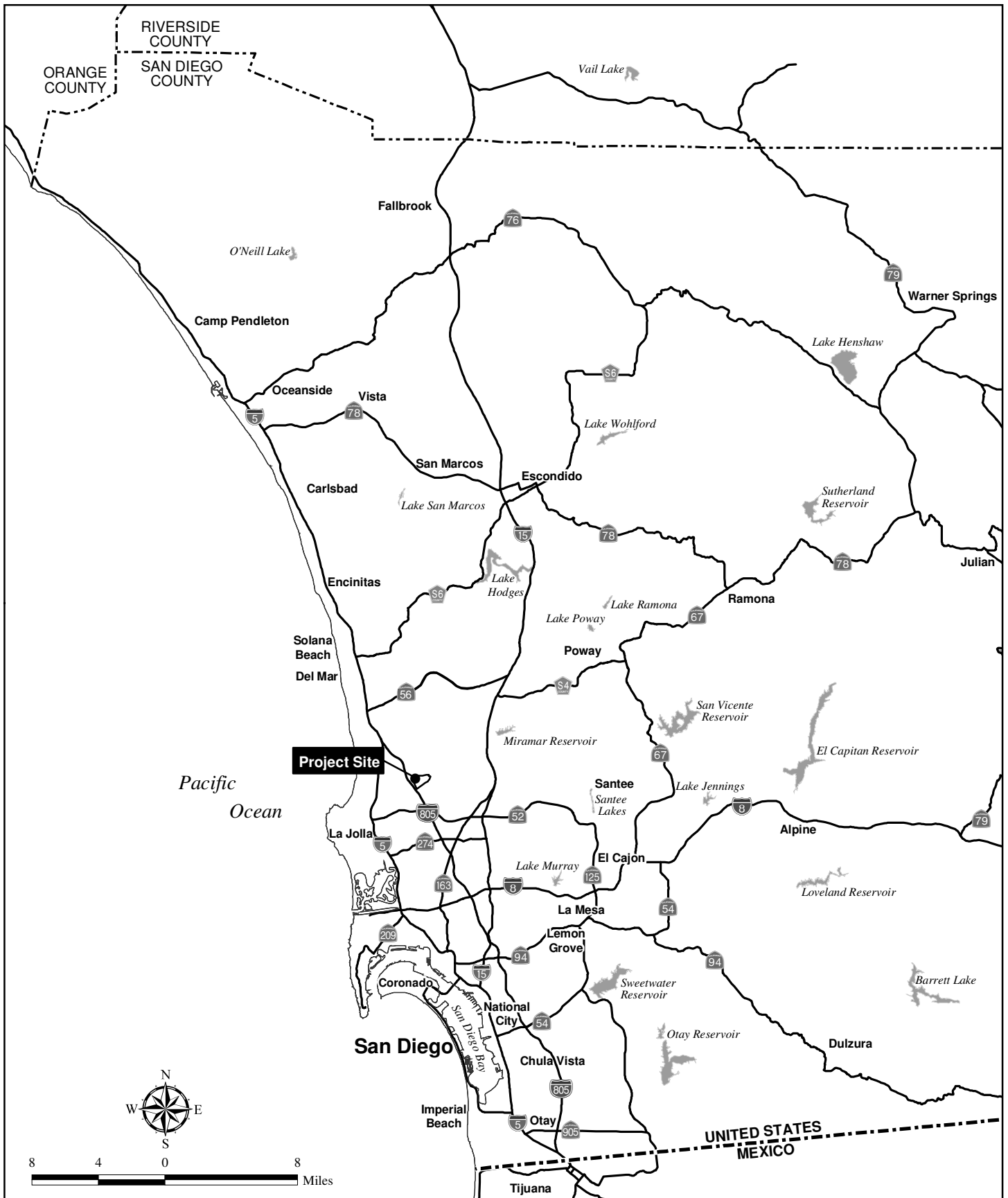
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Table 1 CORPS JURISDICTIONAL IMPACTS	
HABITAT	IMPACTS (acre)
Wetland Waters of the U.S.	
Emergent wetland	0.01
Subtotal	0.01
Non-wetland Waters of the U.S.	
Ephemeral drainage	0.24
Subtotal	0.24
TOTAL	0.25

D. MITIGATION REQUIREMENTS

Pursuant to Section 404 of the federal Clean Water Act, the Corps regulates the discharge of fill material into WUS and evaluates the impacts of the placement of proposed fill into such waters. Under Section 401 of the federal Clean Water Act, the Regional Water Quality Control Board (RWQCB) also has authority over Corps jurisdictional areas. To ensure no-net-loss of wetland habitat acreage as well as associated functions and services, the Corps requires compensatory mitigation for jurisdictional impacts. Based on assessed net and temporal losses, the proposed mitigation ratio for impacts to EMW is 4:1, and for ephemeral drainages is 2:1 (Table 2). To ensure that there is no-net-loss of jurisdictional habitat, mitigation in the form of creation will be at least equal the amount of habitat impacted (1:1). Based on the ratios above, required mitigation includes a minimum of 0.25 acre of created jurisdictional habitat, and 0.27 acre of enhancement.

Table 2 WETLAND MITIGATION REQUIREMENTS			
HABITAT	IMPACTS (acre)	MITIGATION RATIO	MITIGATION (acre)
Wetland Waters of the U.S.			
Emergent wetlands	0.01	4:1	0.04
Subtotal	0.01	-	0.04
Non-wetland Waters of the U.S.			
Ephemeral drainage	0.24	2:1	0.48
Subtotal	0.24	-	0.48
TOTAL	0.25	-	0.52



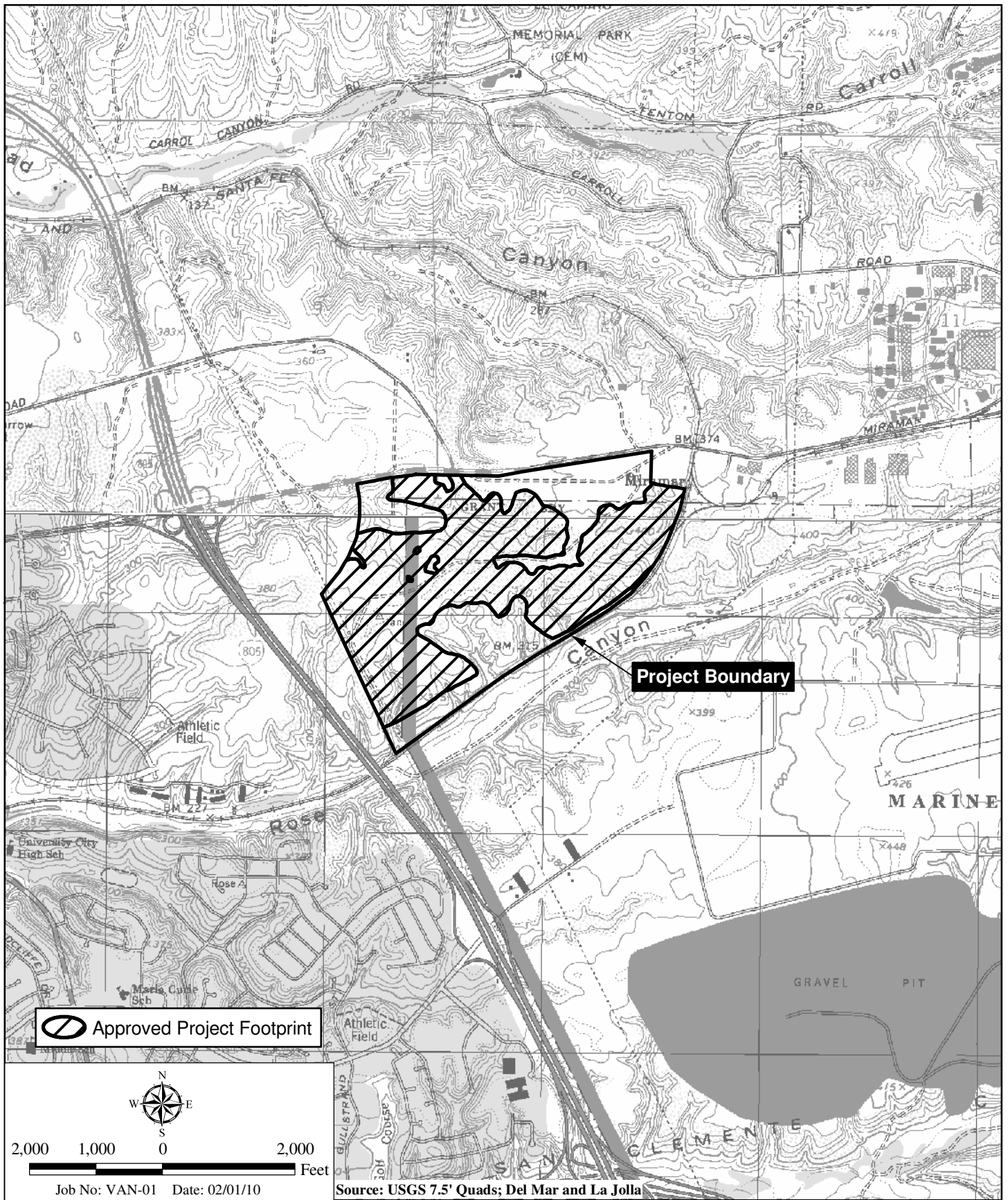
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Regional Location Map

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Figure 1



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Project Location Map

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Figure 2

Recent Corps documents (Regulatory Guidance Letter published by the Corps on December 24, 2002, and Special Public Notices published by the Los Angeles District on January 27, 2003 and April 19, 2004) emphasize the importance of maximizing the functions provided by compensatory mitigation, and encourage the use of functional assessments (such as the Corps' Hydrogeomorphic [HGM] Approach) for evaluating impacted aquatic resources (prior to impacts), determining appropriate mitigation ratios and success criteria, and assessing the compensatory mitigation following implementation. To comply with these recommendations, the HGM Approach will be used to assess existing conditions in jurisdictional areas that will be impacted by project development, and this information will be used as a comparison for assessing the functions and services of created/enhanced jurisdictional areas (see Section VIII.D.2 for additional details on this approach).

III. MITIGATION SITE DESCRIPTION

A. MITIGATION LOCATION

The proposed wetland mitigation (creation and enhancement) would occur on site, on land currently owned by the federal government. Creation and enhancement of non-wetland WUS would occur in the northeastern corner of the site near and along two existing ephemeral drainages, while creation of wetland habitat would occur adjacent to existing wetland habitat in the northeastern and northwestern corners of the site (Figures 3 and 4).

B. ENVIRONMENTAL SETTING

The portions of the site that are targeted for creation/enhancement of jurisdictional areas are currently undeveloped and are either not vegetated or contain non-native species. The incised drainages on site generally flow from north to south and water during storm events flows into Rose Canyon (off site and immediately to the south). As part of the proposed project, a cemetery and associated structures and roads will be developed adjacent to the mitigation areas.

The majority of the site is comprised of the Redding group of shallow, cobbly, or gravelly loams. Redding soils have severe erosion potential due to shallow depth to rock and, in some cases, steepness. Where they are more gently sloping, these soils form "mima mounds" that harbor vernal pools and associated special status species. Erosion is of particular concern in areas where this soil is expected to be exposed or disturbed by construction activity or removal of vegetation.

C. EXISTING FUNCTIONS AND SERVICES

The areas proposed for creation/enhancement occur along the margins of existing, incised ephemeral drainages and/or are dominated by invasive non-native species such as pampas grass (*Cortaderia* sp.) or eucalyptus (*Eucalyptus* spp.). All areas proposed for creation/enhancement are surrounded by native vegetation consisting mostly of Diegan coastal sage scrub and southern mixed chaparral. Since the drainages proposed for creation/enhancement occur along existing drainages within a large area of native habitat, they provide the functions and services typical of

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naturally occurring ephemeral drainages such as erosion control, watershed recharge, water purification, and as foraging habitat for wildlife. The functions and services of areas dominated by pampas grass and eucalyptus are likely substantially reduced compared to adjacent native habitat, as documented in previous research. Large eucalyptus trees often function as roosting and nesting habitat for a variety of raptors and, based on the size of the trees located on site, they are likely to currently provide these services.

D. MITIGATION SITE SUITABILITY

The proposed mitigation area is considered suitable for wetland habitat enhancement and creation since the site currently supports a patchwork of ephemeral drainages and riparian scrub (SWS and baccharis scrub [BS]). The proposed creation/enhancement would occur in the vicinity of these jurisdictional areas.

IV. MITIGATION DESIGN CONCEPT

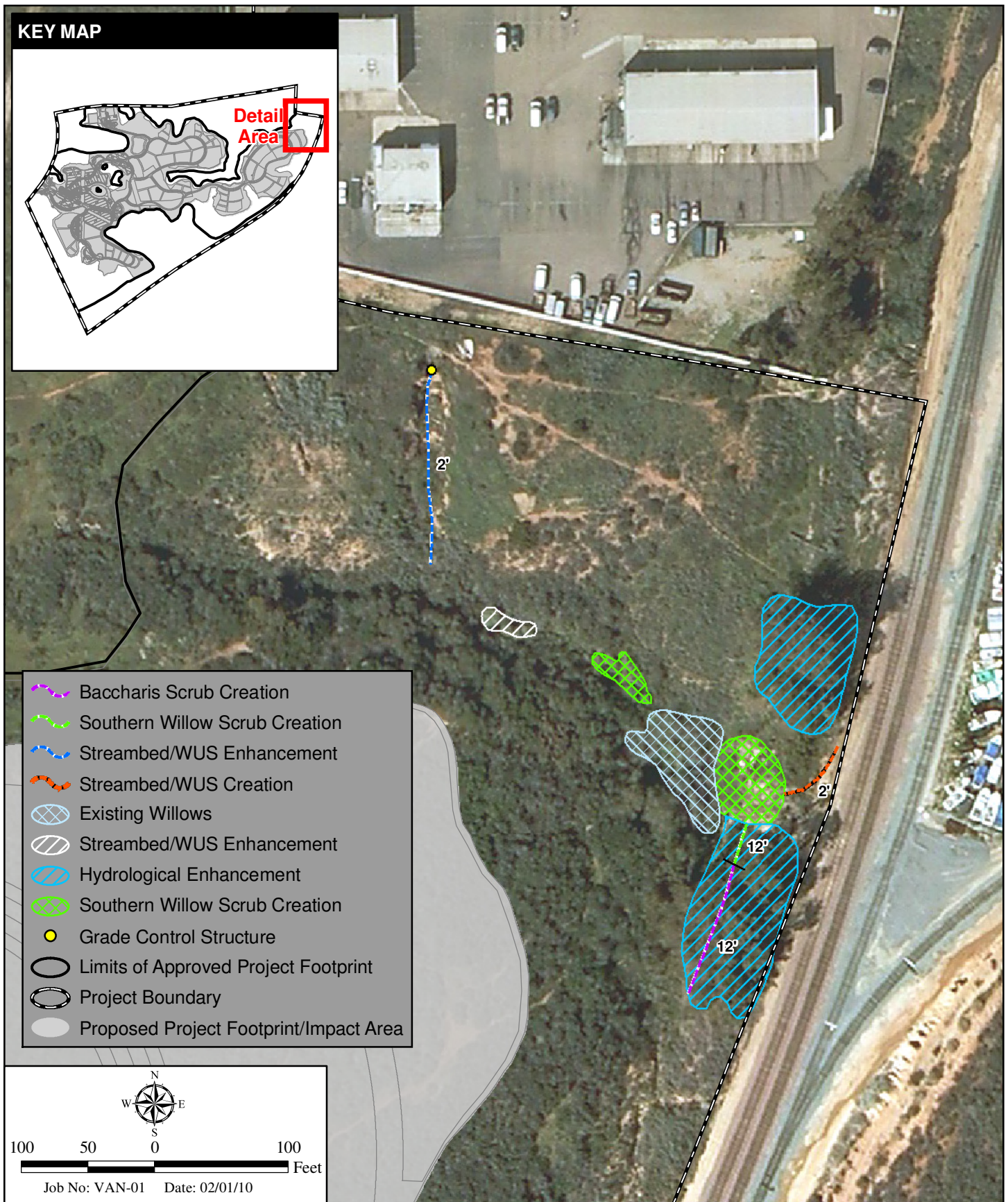
This project has submitted permit applications to the Corps under Section 404 of the federal Clean Water Act and to the RWQCB under Section 401 of the federal Clean Water Act for impacts to jurisdictional areas, based on the mitigation described herein.

A. MITIGATION DESIGN

To meet Corps and RWQCB mitigation requirements, this plan recommends measures to improve the quality of existing jurisdictional areas via enhancement of existing and creation of additional jurisdictional areas in unvegetated or disturbed areas of the site or areas dominated by non-native grasses. Enhancement will occur along existing ephemeral drainages by expanding hydrology into adjacent unvegetated areas that had been part of the drainage before it became incised during heavy flow events. Incised sections of the drainages will be restored to their pre-eroded topography with an increased width to prevent future erosion. In addition, enhancement will involve removing invasive, non-native plants from along an existing drainage. Wetland habitat creation will consist of establishing SWS and BS habitat in drainages that contain fill and are dominated by invasive non-native plants or non-native grassland. These 2 vegetation communities are considered appropriate for the site because they occur naturally in close proximity to the proposed creation areas. Several hydrologic and topographic modifications would be made to ensure the establishment and long term viability of these habitats.

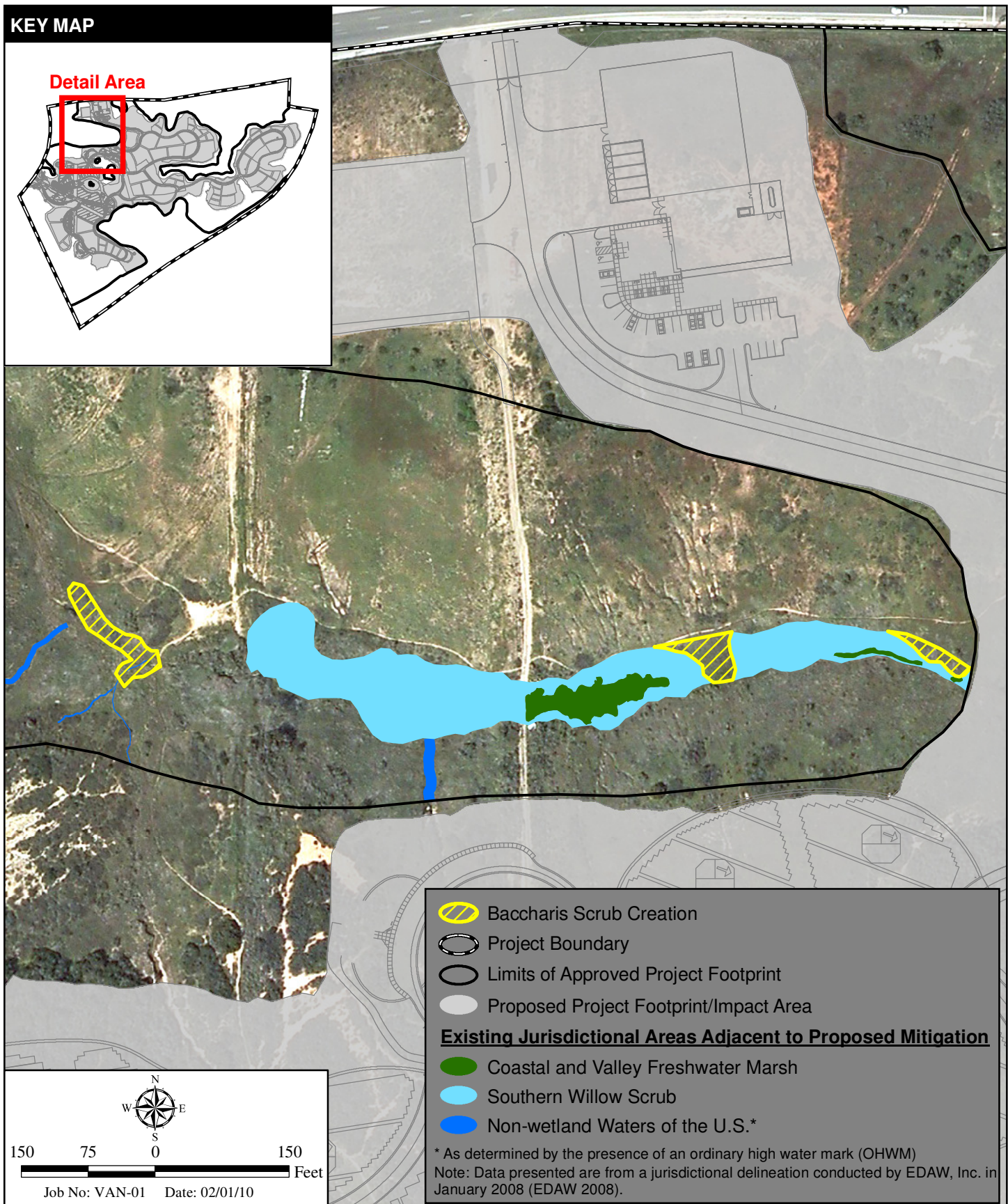
Specifically, 0.02 acre of ephemeral drainages containing non-wetland WUS will be enhanced, with an additional 0.34 acre of hydrological enhancement, and less than 0.01 acre of non-wetland WUS and 0.27 acre of wetland habitat will be created (Table 3; Figures 3 and 4). In Area 1, restoration will include BS and SWS creation, streambed creation, streambed enhancement, and hydrological enhancement. Enhancement of a 2-foot wide existing drainage will consist of filling the incised channel with a combination of rock and soil, which will broaden out the flow path by 1 foot on either side of the existing channel, resulting in a wider drainage (Figure 3). In addition, a grade control structure will be installed at the upstream end of this

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Area 1-Wetland Mitigation

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Area 2-Wetland Mitigation

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drainage, along a dirt road in order to replace the existing, highly deteriorated Arizona crossing and stabilize the slope against erosion. Streambed enhancement will also occur downstream, by removing a stand of highly invasive pampas grass (white-hatched polygon shown in Figure 3).

Hydrological enhancement will include the removal of 2 large stands of eucalyptus adjacent to the railroad right-of-way. Eucalyptus is known for using large amounts of water and it is thought that removing the trees will increase water availability in the immediate vicinity, including the areas proposed for wetland habitat creation. SWS habitat would be created in 3 areas near existing willow trees (Figure 3): (1) by removing highly invasive pampas grass from an existing drainage swale (western green-hatched polygon); (2) by lowering the grade in areas currently containing a spoils pile (eastern green-hatched polygon); and (3) by removing highly invasive eucalyptus trees from along an existing 12-foot-wide drainage. A 12-foot wide swath of BS also will be created in the drainage that currently supports eucalyptus woodland. All SWS and BS habitat creation will include the installation of container plantings and seed as well as temporary irrigation to aid plant establishment. Lastly, BS habitat will be created in Area 2 (Figure 4), with some slight grading along an existing ephemeral drainage that already contains BS habitat as well as patches of SWS. An existing earthen dam, already breached and containing a corrugated metal pipe, will be entirely removed to promote flows to the far downstream (west end) creation area. A few existing broom baccharis plants (*Baccharis sarothroides*) growing on the dam would be temporarily impacted by this removal, but the area would be fully re-vegetated as part of the restoration effort. Some of the wetland creation proposed in this plan is located in areas that are mapped as native habitat; however, all areas were closely inspected, and creation was only designated in areas that currently contain fill soils, are unvegetated, contain highly invasive non-native species, or are dominated by non-native grasses.

Table 3
PROPOSED WETLAND MITIGATION

MITIGATION TYPE	ACRE(S)		
	Creation	Enhancement	TOTAL
Wetland Waters of the U.S.			
Southern willow scrub	0.09	--	0.09
Baccharis scrub	0.18	--	0.18
Hydrological improvements	--	0.34	0.34
Subtotal	0.27	0.34	0.61
Non-wetland Waters of the U.S.			
Ephemeral drainage	<0.01	0.02	0.03
TOTAL	0.28	0.36	0.64

The proposed mitigation for impacts to wetland habitat will exceed the 1:1 wetland creation requirement by 0.26 acre with the creation of 0.09 acre of SWS and 0.18 acre of BS (wetland impacts total 0.01 acre); remaining habitat mitigation will be met with hydrological enhancement consisting of the removal of eucalyptus trees at 2 locations along and/or near existing drainages.

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Mitigation for impacts to ephemeral drainages will be met with a combination of enhancement of existing drainages, creation of additional drainage area by widening some of the existing drainages, and SWS and BS creation along existing drainage features (i.e., excess wetland creation). A total of 0.52 acre of wetland mitigation is required, while 0.64 acre is proposed.

B. TARGET FUNCTIONS AND SERVICES

The goal of wetland restoration within the site is to establish habitat that can perform the same functions and services (flood control, water filtration, wildlife habitat, etc.) that are already being performed by adjacent native habitat. Target biological functions and services include increased cover by native vegetation and increased use by a variety of wildlife. While some habitat functions for raptor species may decrease with the removal of eucalyptus trees, it is anticipated that habitat functions for numerous other species will be improved with the establishment of additional riparian vegetation. At the end of 5 years of maintenance and monitoring, the vegetated areas are still expected to be in relatively early stages of habitat development; however, all restored habitat is expected to contain enough native vegetation and be on the trajectory toward developing target functions and services. It is anticipated that the functions and services of jurisdictional areas located in the enhanced/created areas will be increased as a result of implementing this restoration plan. To demonstrate the wetland functions and services of this creation/enhancement effort, the various areas will be assessed using the HGM Approach.

C. RATIONALE FOR EXPECTING IMPLEMENTATION SUCCESS

Enhancement and creation of riparian habitat within the mitigation areas is anticipated to be successful because these areas are located along existing ephemeral drainages and/or adjacent to existing riparian habitat.

V. PROJECT RESPONSIBILITY

A. RESPONSIBLE PARTY(IES)

The Project is located on lands managed under a “use agreement” dated April 2008 between the Department of Navy (DoN) and Department of Veterans Affairs (VA) acting on behalf of the National Cemetery Administration (NCA). As the tenant, NCA is solely responsible for all activities associated with the development, operation, and maintenance of the lands within the project boundary. The funding and execution of the wetland restoration work and 5-year maintenance and monitoring program will be an NCA responsibility. For development related matters, the VA point of contact is:

William Peach, Project Manager
Office of Construction and Facilities Management
811 Vermont Avenue NW (OOCFM3B4 Rm. 559 LAF)
Washington, D.C., 20005
Telephone (202) 461-8445
Email: bill.peach@va.gov

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For operations and maintenance related matters, the point of contact is:

Kirk Leopard
Fort Rosecrans National Cemetery
P.O. Box 6237, Point Loma
San Diego, CA 92166
Telephone (619) 553-2084
Email: kirk.leopard1@va.gov

B. RESTORATION SPECIALIST

Overall supervision of the installation, maintenance, and monitoring of this mitigation project will be the responsibility of a restoration specialist with experience in wetland habitat restoration. The restoration specialist will oversee the efforts of the installation and maintenance contractor(s) for the life of the project. Specific tasks of the restoration specialist include educating all participants with regard to mitigation goals and requirements; directly overseeing grading, planting, seeding, weeding, and maintenance; and coordinating annual assessments, including plant and avian surveys. The restoration specialist will ensure that the contractor does not inadvertently impact sensitive habitat areas (and sensitive species). When necessary, the restoration specialist will provide the project proponent and contractor with a written monitoring memo, including a list of items in need of attention. The restoration specialist will prepare and submit required reports to the project proponent(s), Corps, and RWQCB each year.

C. LANDSCAPE ARCHITECT

A licensed landscape architect will prepare the necessary construction documents, including grading, irrigation, and planting plans. In addition, such person will inspect the irrigation system and sign off on proper installation/coverage prior to any plant or seed installation.

D. GRADING CONTRACTOR

The grading contractor will be responsible for site grading, under the direction of the restoration specialist.

E. INSTALLATION/MAINTENANCE CONTRACTOR

The project proponent will select the installation and maintenance contractor(s) and may change contractors at its discretion. The installation contractor will have wetland habitat restoration experience and be responsible for irrigation installation, pre-planting weed control, planting, seeding, and maintenance. The restoration specialist will supervise the contractor regarding the installation of wetland plants. After the installation contract is completed, the project proponent(s) will hire a maintenance contractor for the duration of the 5-year monitoring period. The maintenance contractor and installation contractor may be the same entity. The maintenance contractor will have experience with the maintenance of native wetland habitat and be familiar with native and non-native plants. The maintenance contractor will service the entire mitigation area according to the maintenance schedule (Section VII.B). Service will include but not be

HELIX

limited to weed control, irrigation maintenance, trash removal, watering, dead plant replacement, and re-seeding. All activities conducted will be seasonally appropriate and approved by the restoration specialist. The maintenance contractor will meet the restoration specialist at the site when requested and will perform all checklist items in a timely manner as directed.

VI. MITIGATION INSTALLATION

A. INSTALLATION SCHEDULE

Implementation of this mitigation plan will begin with project approval, at which time seed and container stock orders will be placed. It is critical that all plant and seed material be ordered as early as possible due to restrictions on the distance of the propagule collection area(s) from the mitigation site. Site preparation and installation should occur in the fall or early winter (i.e., between October and December) to ensure that planting and seeding coincide with the beginning of the rainy season.

Impacts to potential coastal California gnatcatcher (*Polioptila californica californica*) habitat are not anticipated as part of the restoration. However, in accordance with the U.S. Fish and Wildlife Service's (USFWS) Biological Opinion for the project (USFWS 2007), any clearing or grading that would be conducted in suitable gnatcatcher habitat is restricted to the non-breeding season (cannot occur between February 15 and August 31). No seasonal restrictions exist for impacts that would occur outside of suitable gnatcatcher habitat. In addition, due to existing ambient noise levels, no noise restrictions apply to this project for construction activities (e.g., grading and clearing) during the gnatcatcher breeding season (February 15 through August 31) and no surveys for coastal California gnatcatchers are required.

Monitoring of the mitigation effort will begin with the delineation of the creation/enhancement areas and continue through installation and the 5-year maintenance and monitoring period. Maintenance of the created/restored/enhanced habitats will begin following completion of installation, and also continue for 5 years.

B. PLANT AND SEED ORDERS

The plant species selected for installation in this mitigation site have been observed on site or are common in the region and known from this watershed. To maintain genetic integrity and increase long-term survivorship of installed material (plant adaptations to local environmental conditions can increase establishment and decrease mortality), plants and seed installed at the site will be propagated from as close to the project site as possible. The collected seed will be labeled and stored in a cool, dry location until it is used at the mitigation site. The source of all plant material and seed should be provided to the restoration specialist, who must approve all seed and container stock orders prior to finalizing.

C. DOCUMENT PRE-IMPACT CONDITIONS

Prior to initiating project impacts, jurisdictional areas located within the development area will be assessed using the HGM Approach (see Section VIII.D.2). These results will later be compared with similar assessments conducted in the creation/enhancement areas. In addition, to document the progress of the mitigation effort, the restoration specialist will identify, map the location of, and take at least 1 pre-mitigation photo for each designated creation/enhancement area for future comparison with post-installation and annual assessment photos.

D. PRE-CONSTRUCTION MEETING

Prior to initiation of restoration activities, an on-site meeting will be held with the project proponent (NCA), grading contractor, installation contractor, and the restoration specialist. Topics that will be addressed at this meeting include, but are not limited to: (1) timing constraints for clearing/grubbing/grading activities, (2) sensitive areas and a strategy for avoidance of these areas, (3) site access routes and restrictions, (4) staging areas, and (5) overall project goal.

E. MITIGATION SITE FENCING

The grading contractor will survey and stake the limits of the wetland creation/enhancement areas. To avoid unnecessary impacts to existing habitat and maximize the success of the mitigation effort, a restoration specialist will inspect the staking and modify, as necessary, the project limits along existing riparian habitat. The outer limits of the mitigation area will be delineated with orange construction fencing. To protect existing riparian habitat from potential construction and erosion impacts, silt fencing and/or other erosion control measures may be installed along the periphery of creation areas, if deemed necessary by the restoration specialist. A restoration specialist will inspect all fencing prior to the start of construction activities.

F. GRADING / NON-NATIVE PLANT REMOVAL

Grading of some of the proposed creation areas is necessary to create a hydrologic and topographic situation appropriate for the establishment of non-wetland WUS and riparian scrub habitat. To this end, the grading contractor will (1) remove invasive non-native plants located within the streambed/WUS enhancement areas, and (2) conduct any grading required for proposed mitigation areas. The restoration specialist should be on site during clearing and grubbing of vegetation or grading of non-vegetated areas that occur adjacent to existing native habitat. Graded mitigation should be the same elevation as adjacent existing jurisdictional areas, or as directed by the restoration specialist, and shall be left in a rough grade state with micro topographic relief (including channels for wetlands) that mimics natural topography, as directed by the restoration specialist. All plant material, as well as any trash and other debris removed from the project area, will be disposed of in a licensed landfill. Planting and irrigation should not be installed until the restoration specialist has approved of the mitigation site grading.

If site development in areas containing wetland habitat occurs prior to restoration installation, the top 12 inches of topsoil should be salvaged from the impacted wetlands to use in the creation areas. Topsoil includes nutrients, microorganisms, mycorrhizae, and a seed bank that would aid in the establishment of native wetland habitat.

G. IRRIGATION

Following grading, the installation contractor will install temporary above-ground irrigation in the SWS and BS creation areas according to the project construction drawings. The irrigation system will incorporate the use of moisture sensors connected to an irrigation controller; this will allow for the application of water on an as-needed basis. The project landscape architect, together with the installation contractor, will inspect the irrigation to ensure proper installation and full coverage of target areas prior to plant/seed installation.

H. PLANT AND SEED INSTALLATION

Once the area has been graded and irrigation installation is complete, the riparian scrub (SWS and BS) creation areas will be planted and seeded (Tables 4, 5, and 6). Nursery-grown container plants and/or cuttings and native seed propagated or collected from on site or nearby sources will be used. All seed and container stock must be inspected and approved by the restoration specialist prior to installation. Container stock should be installed in holes that are at least 1.5 times larger than the container. Holes will be dug with mechanical augers where possible and by hand elsewhere. Seed should be hand-spread following planting and raked in.

Table 4 SOUTHERN WILLOW SCRUB AND BACCHARIS SCRUB SEED MIX (0.27 acre)					
Scientific Name	Common Name	Lbs/ Acre	% Pur/ Germ	% Live Seed	Total Lbs
<i>Ambrosia psilostachya</i>	western ragweed	6	--	--	2
<i>Artemisia douglasiana</i>	Douglas' mugwort	6	10/50	5	2
<i>Baccharis salicifolia</i>	mule fat	6	10/20	2	2
<i>Baccharis sarothroides</i>	broom baccharis	6	5/40	2	2
<i>Isocoma menziesii</i>	goldenbush	6	--	--	2
<i>Iva hayesiana</i>	San Diego marsh elder	4	35/20	7	1
<i>Juncus acutus</i> ssp. <i>leopoldii</i>	southwestern spiny rush	2	90/40	36	0.5
<i>Leymus condensatus</i>	giant wild rye	4	80/80	64	1
<i>Muhlenbergia rigens</i>	deergrass	4	--	--	1
<i>Pluchea sericea</i>	arrow weed	2	20/40	8	0.5
TOTAL					14.0

Table 5
SOUTHERN WILLOW SCRUB CONTAINER PLANT PALETTE
(0.09 acre)

Scientific Name	Common Name	Number Per Acre	Container Size	Spacing on Center (feet)	Total Number
<i>Baccharis salicifolia</i>	mule fat	400	1-gallon	5	36
<i>Distichlis spicata</i>	saltgrass	600	plugs	4	55
<i>Iva hayesiana</i>	San Diego marsh-elder	200	1-gallon	4	18
<i>Leymus condensatus</i>	giant wild rye	250	1-gallon	4	23
<i>Leymus triticoides</i>	beardless wild ryegrass	250	plugs	4	23
<i>Salix exigua</i>	slender willow	300	1-gallon	12	27
<i>Salix lasiolepis</i>	arroyo willow	200	1-gallon	12	18
<i>Salix gooddingii</i>	black willow	300	1-gallon	15	27
<i>Sambucus mexicana</i>	blue elderberry	50	1-gallon	15	5
TOTAL					232

Table 6
BACCHARIS SCRUB CONTAINER PLANT PALETTE
(0.18 acre)

Scientific Name	Common Name	Number Per Acre	Container Size	Spacing on Center (feet)	Total Number
<i>Baccharis salicifolia</i>	mule fat	500	1-gallon	5	90
<i>Baccharis sarothroides</i>	broom baccharis	500	1-gallon	5	90
<i>Distichlis spicata</i>	saltgrass	500	plugs	4	90
<i>Iva hayesiana</i>	San Diego marsh-elder	150	1-gallon	4	27
<i>Leymus condensatus</i>	giant wild rye	250	plugs	4	45
<i>Pluchea sericea</i>	arrow weed	150	1-gallon	12	27
<i>Salix exigua</i>	slender willow	150	1-gallon	12	27
<i>Sambucus mexicana</i>	blue elderberry	60	1-gallon	15	11
TOTAL					407

I. AS-BUILT CONDITIONS

The restoration specialist shall submit a brief letter report to the appropriate regulatory agencies (Corps and RWQCB), including an as-built graphic, within 6 weeks of completion of restoration installation. This letter will describe site preparation, installation methods, and the as-built status of the restoration project and will include photographs taken from the previously identified photo stations. The as-built letter will serve as the "time zero" report, noting when the 5-year maintenance and monitoring period has begun. If requested, a post installation site visit may be scheduled with the regulatory agencies.

VII. MAINTENANCE PLAN

A. MAINTENANCE ACTIVITIES

A 5-year maintenance program is proposed to ensure the successful establishment and persistence of the created and enhanced wetland habitat. The maintenance program will involve removal of trash, weed control, irrigation maintenance, and any remedial measures deemed necessary for the success of the restoration program (e.g., re-seeding and re-planting). Maintenance activities will be directed by the restoration specialist.

1. General Maintenance

It is the contractor's responsibility to keep all planted areas free of debris, monitor irrigation function and scheduling, monitor plant material condition and health, and conduct weeding and erosion control. During the first year of the contract, these events will be conducted twice a month; for the remainder of the 5-year period, maintenance activities will be conducted monthly.

These maintenance guidelines are specifically tailored for native plant establishment. Maintenance personnel will be fully informed of the habitat creation/enhancement program so that they understand the effort's goals and maintenance requirements. A professional with experience and knowledge in native habitat creation/restoration/enhancement will supervise all maintenance activities.

Damage to plants, irrigation systems, and other facilities occurring as a result of unusual weather or vandalism will be repaired as directed by the restoration specialist. The cost of such repairs will be paid for as extra work. The contractor will repair any damage caused by the contractor's inadequate maintenance or operation of irrigation facilities, as determined by the restoration specialist.

2. Non-native Plant Control

Particular emphasis will be placed on proactive removal of non-native plants. Eradication of these species will be conducted as necessary to minimize competition that could prevent the establishment of native species. Non-native plants should be removed by hand or controlled with the proper herbicides. Maintenance personnel should be knowledgeable in distinguishing

HELIX

between native and non-native species; however, additional guidance will be provided, as needed, by the restoration specialist.

Non-native species considered to be highly invasive by the California Invasive Plant Council (Cal-IPC List A and B species; 2006) shall be totally eradicated within restoration boundaries. Examples of invasive plants include pampas grass (*Cortaderia jubata*), fennel (*Foeniculum vulgare*), blue gum (*Eucalyptus globulus*), tamarisk (*Tamarix* sp.), and artichoke thistle (*Cynara cardunculus*). Additional species may be added to this list if found to be a threat to the long-term success of the restoration effort.

3. Irrigation

The goal is to obtain germination and growth with the least amount of irrigation. Frequent irrigation encourages invasion by rapidly colonizing non-native plants and leaches nutrients from the soil; therefore, water will be applied infrequently and only as needed to prevent plant and seedling mortality. Native plantings that are infrequently irrigated may grow slower initially but will ultimately be better able to withstand natural variations in rainfall and, therefore, be more successful long-term. The irrigation schedule will attempt to develop deep root growth with evenly spaced, infrequent, deep applications of water. To obtain deep penetration of water, the irrigation system may be activated several times in one 24-hour period. Irrigation will be minimized to the extent possible following natural rainfall events.

The irrigation system will be maintained until the restoration specialist determines that supplemental water is no longer required. At that time, irrigation will be permanently disconnected (e.g., the mainline will be cut), but not removed. Above-ground portions of irrigation will be removed when directed by the restoration specialist.

4. Other Pests

Insects, vertebrate pests, and diseases will be monitored. Generally speaking, there will be a high threshold of tolerance before control measures are considered. As required by law, specific recommendations will be made only by a licensed pest control adviser. All applicable federal and state laws and regulations will be closely followed. The restoration specialist will be consulted on any pest control matters.

5. Fertilization

Fertilizer will not be applied except in extraordinary circumstances and only at the written direction of the restoration specialist.

6. Pruning

No post-installation pruning is necessary unless otherwise directed by the restoration specialist.

B. MAINTENANCE SCHEDULE

Maintenance will be performed as necessary to prevent re-seeding by non-native plants and frequency will likely change with varying site conditions and seasons; the schedule outlined herein (Table 7) serves only as a guideline. At a minimum, the installation contractor will conduct monthly maintenance during a 90-day establishment period, or until the restoration specialist recommends sign off of the establishment period in writing. The maintenance contractor will be responsible for all maintenance activities during the remainder of the 5-year maintenance period. For the first 3 years of the 5-year maintenance and monitoring period, maintenance is expected to be required once per month between January and June (to cover the peak growing period for most plants) and bimonthly (i.e., every other month) between July and December each year. Maintenance visits may be reduced to quarterly visits in Years 4 and 5 if re-seeding by non-native species can be prevented with this weeding frequency. The installation/maintenance contractor(s) will complete maintenance requests from the restoration specialist within 14 days of any written request or monitoring report.

Table 7 MAINTENANCE SCHEDULE*	
PHASE	SCHEDULE
Years 1 through 3 January – June July – December	Monthly Bi-monthly
Years 4 and 5	Quarterly

*This schedule is only a guideline; maintenance will be performed as necessary and as directed by the restoration specialist.

VIII. MONITORING PLAN

Monitoring and annual assessments will be carried out under direction of the restoration specialist. This monitoring program will begin with habitat installation and continue for 5 years. Monitoring will include (1) pre-construction monitoring; (2) installation monitoring; (3) maintenance monitoring; and (4) technical monitoring. During each visit, the restoration specialist will inspect the site to ensure that the restoration effort is progressing as planned and identify any problems that may affect the effort.

A. PRE-CONSTRUCTION MONITORING

One pre-construction meeting will be held to discuss site constraints and the overall project goal (see Section V.D., above, for more details). Pre-impact conditions of jurisdictional areas will be documented within the development area using the Corps' HGM Approach. In addition, pre-restoration conditions within designated creation/enhancement areas will be documented by photographing each creation/enhancement area from designated photo stations. Information from both of these data collection events will later be used to track the changes in the created/enhanced jurisdictional areas as a result of restoration.

HELIX

B. INSTALLATION MONITORING

A restoration specialist will monitor all phases of the installation process, including site preparation (fencing, grading, and non-native plant removal) and installation of irrigation, plants, and seed. The restoration specialist must inspect and authorize each phase of work before the next phase may begin. Following the completion of installation, the restoration specialist will prepare a letter for submittal to the Corps and RWQCB that summarizes the installation process, provides all pre-construction and post-installation site photos, and states that the installation has been monitored/inspected and is complete.

C. MAINTENANCE MONITORING

Following installation, a restoration specialist will monitor maintenance activities conducted by the maintenance crews during the 5-year maintenance and monitoring period (Table 8). The initial 90-day establishment period will occur within the first 3 months of the 5-year period. A total of 8 monitoring visits will be conducted during Years 1 and 2 - visits will be conducted monthly from January through June and 2 additional times in the remainder of the year (August and October are recommended). Quarterly visits (recommended to occur in March, June, September, and December) will be conducted during Years 3 through 5. This monitoring schedule is the minimum; more frequent inspections may be necessary if there are problems with contractor performance or habitat development.

Table 8 MAINTENANCE MONITORING SCHEDULE*	
PHASE	SCHEDULE
Years 1 and 2	8 visits
January to June	Monthly
July to December	Twice (August and October)
Years 3 to 5	4 visits (March, June, September, and December)

*This schedule is only a guideline; monitoring will be performed as necessary, as determined by the restoration specialist.

Monitoring memos noting any issues with plant establishment, irrigation, sediment control, etc., will be provided as necessary to the installation/maintenance contractor(s) and project proponent(s).

D. TECHNICAL MONITORING

In addition to maintenance monitoring visits, the restoration specialist will conduct an annual technical monitoring visit in August of each year during the 5-year maintenance and monitoring period. The visits are recommended for August to coincide with the peak of the wetland vegetation growing season. The exact timing of the visits will depend on site and weather conditions.

HELIX

1. Vegetation Monitoring

Due to the small size of the wetland creation and enhancement areas, annual technical monitoring will be limited to a qualitative (visual) assessment. The following data on vegetation cover will be collected for each creation/enhancement area: (1) visual estimates of native and non-native cover, by height class; (2) counts of surviving container plantings; (3) tree and shrub height; (4) observations of native plant recruitment; and (5) a list of all species observed. Vegetation will be recorded separately for herb (0 to 0.6 meter), shrub (0.6 to 2 meters), and tree (greater than 2 meters) layers.

2. Target Functions and Services Monitoring

To provide a functional assessment of the wetland mitigation effort, the HGM Approach will be used; a total of 9 metrics will be evaluated to determine the riparian functions of each area proposed for wetland creation/enhancement. The metrics evaluated describe 3 categories of functions: hydrologic functions, physical process functions (e.g., biogeochemical functions), and biological functions related to habitat (Brinson et. al. 1995; Smith et. al. 1995). In addition to these metrics, the progress of the restoration effort will be tracked by comparing photos taken during the annual assessments with photos taken at the same locations immediately following restoration installation.

Hydrological Monitoring

Evidence of hydrology within wetland creation and enhancement areas shall be determined visually, by looking for the following characteristics:

- (1) evidence of sediment movement through the site;
- (2) evidence of moist soil in the top 18 inches of soil within Corps jurisdictional areas, 2 weeks after a major rain event within the primary channel targeted for riparian habitat enhancement; and
- (3) evidence of the following field indicators of dynamic HGM processes: (a) topographic complexity from sediment scour and deposition resulting in meander scroll and pools, small surface channels, or hummocks; (b) redistribution of detritus such as debris jams or drift lines; (c) overbank or overland flooding indicated by high-water marks or silt layers on vegetation; or (d) presence of surface deposition from microbial processing such as humus layer or woody debris.

Biochemical Monitoring

Biochemical functions include the cycling of nutrients, removal of imported elements and compounds from the system, retention of particulates, and export of organic carbon. Nutrient cycling includes 2 variables: aerial net primary productivity (ANPP) and annual turnover of detritus. The ANPP of a wetland typically corresponds to the total leaf area, which in turn is a measure of what the biomass produces, and is balanced with the detrital turnover of the system. Riparian forests typically have a higher ANPP, and higher detrital stocks and detrital turnover than chaparral habitats. Because direct measurements of ANPP are impractical, measurements of nutrient cycling will rely on vegetative cover relative to the reference site(s) for the project (areas that will be impacted by project development).

HELIX

Biochemical functions will be monitored by assessing vegetative cover as outlined in Section VIII.D.1 above, as well as collecting data for detrital and soil organic matter. The detrital and soil organic matter data collected for the restoration areas will be visually collected, and compared to data collected within the impacted jurisdictional areas prior to development.

Removal of elements and compounds shall be measured by the presence of evidence of flooding in the form of at least 2 of the following: water marks, silt lines, drift and/or wrack lines, sediment scour, or deposition. Retention of particulates shall be measured using vegetative cover and the measures used for the removal of elements and compounds. Export of organic carbon includes the criteria for removal of elements and compounds, as well as visual estimates of litter and coarse woody debris for both the restoration site and the reference site, as noted above.

Biological Monitoring

Biological monitoring will consist of plant cover criteria (described in Section VIII.D.1, above) as well as vertebrate monitoring. Avian species are the most easily observable vertebrate group, and are ideal for monitoring the overall health of a riparian system. Bird usage of the restoration area will be monitored every May by walking each creation/enhancement area and identifying all birds by either sight or vocalization. The number of individuals and species shall be recorded.

3. Photo Documentation

In addition to qualitative monitoring, several permanent stations for photo documentation will be established prior to installation. Photos will be taken as part of all 5 annual monitoring events and will be included in the respective year's annual report.

4. Annual Reports

An annual report will be prepared each year during the 5-year monitoring period. Each report will present the results of the annual assessment, evaluate the success of the mitigation effort to date, and provide any recommendations for future work that may be deemed necessary.

IX. SUCCESS CRITERIA

The following sections provide standards to determine the successful completion of the restoration effort. Attainment of these standards indicates that the restoration area is progressing toward providing the habitat functions and services targeted by this restoration effort, as outlined in this plan.

A. 90-DAY ESTABLISHMENT PERIOD

Success at the end of the 90-day establishment period will be met if non-native cover is less than 10 percent, there is 80 percent survivorship of container stock (planting is proposed to occur at a higher than typical initial density to allow for some plant mortality; therefore, survivorship is not

HELIX

set at 100 percent), the irrigation system provides adequate cover and appropriate application rates, there are no erosion-related issues, and there is evidence of seed germination. Container stock shall be in the ground for at least 30 days prior to the end of the establishment period.

B. VEGETATION CRITERIA

To determine successful vegetation development in the wetland creation areas, survivorship of native plantings will be determined, and native and non-native plant cover and species richness will be visually estimated.

1. Survivorship

Container plant survival should be 80 percent of the initial plantings for the first 5 years. At the first and second anniversary of plant installation, all dead plants should be replaced unless their function has been replaced by natural recruitment, which would be determined by the restoration specialist. If plant mortality continues to be a problem, alternative measures (e.g., additional seeding) should be considered.

2. Native Cover

Native cover will be visually estimated separately for herb, shrub, and tree layers. No specific cover criteria are established for Years 1 or 2; however, starting in Year 3, the wetland creation areas should attain at least 50 percent total native cover (Table 9). At the end of the 5-year monitoring period, native cover will be at least 70 percent. If annual goals for vegetative cover are not met, remedial measures, including reseeding, planting, and increased weeding, may be implemented to ensure final success.

Table 9
VEGETATIVE COVER SUCCESS CRITERIA

YEAR	SURVIVORSHIP TARGET (percent)	NATIVE COVER TARGET (percent)	NON-NATIVE COVER LIMIT (percent)	INVASIVE PLANT COVER LIMIT (percent)	SPECIES RICHNESS TARGET (species)	RECRUITMENT (species)
Wetland Creation Areas						
3	80	50 ¹	10	0	4	2
4	80	60 ²	10	0	4	2
5	80	70 ³	10	0	5	2

¹ Including at least 20 percent herbaceous layer, 20 percent shrub layer, and 10 percent tree layer cover.

² Including at least 15 percent herbaceous layer, 30 percent shrub layer, and 15 percent tree layer cover.

³ Including at least 10 percent herbaceous layer, 35 percent shrub layer, and 25 percent tree layer cover.

3. Non-native Cover

Non-native plants are typically a problem with habitat creation/restoration, particularly at the outset of the project. Although non-native plants are expected to be a problem, focused maintenance efforts will reduce weed cover to an acceptable level. As the mitigation takes hold, cover by other non-native plants should decrease. Non-native cover should not exceed 10 percent cover in Years 3, 4, or 5.

All non-native species considered to be highly invasive by the California Invasive Plant Council (Cal-IPC List A and B species; 2006) shall be totally eradicated from the restoration site. A total of 5 List A and B species have been targeted for complete eradication within the restoration areas (created and enhanced) on site: fennel, pampas grass, arundo, artichoke thistle, and tamarisk. There will be no tolerance for these species within the restoration areas. At the end of the 5-year maintenance and monitoring period, the acceptable cover value for each of these 5 species will be zero. Additional species may be added to this list if found to be a threat to the long-term success of the restoration effort.

4. Species Richness and Recruitment

Species richness is the number of species in a given area. The final (Year 5) success criterion for species richness area is at least 5 species in riparian habitat.

Recruitment is the successful, natural reproduction and/or establishment of plants in a given area. The higher the number of species naturally recruiting, the more likely the habitat will be self sustaining and diverse in the long term. Recruitment of at least 2 native species should be observed in the wetland creation areas.

C. TARGET FUNCTIONS AND SERVICES CRITERIA

The goal of this mitigation effort is to increase the amount and improve the quality of native wetland and non-wetland habitats on site. In this way, the functions and services of the created and enhanced habitats will be higher than those currently present at the mitigation site. It is expected that habitat function and services (i.e., wildlife use, hydrological functions, etc.) will increase over time and be an improvement over the existing conditions. To comply with the HGM Approach, this project has established target hydrological, biochemical, and biological functions.

1. Hydrological

Target hydrological functions for all wetland creation and enhancement areas are outlined in Table 10.

Table 10
HGM SUCCESS CRITERIA

HYDROLOGICAL	
1. Sediment movement	Presence
2. Moist soil in top 18"	Presence
3. Dynamic hydrogeomorphic processes (presence of at least 3 of the following) Topographic complexity Redistribution of detritus Flooding Microbial processing	
BIOGEOCHEMICAL	
4. Cycling of nutrients	
Native cover	70 percent*
Detrital and soil organic matter	50 percent*
5. Removal of imported elements and compounds	
Evidence of flooding (presence of at least 2 of the following) Water marks Silt lines Drift and/or wrack lines Sediment scour Deposition	
6. Retention of particulates	
Evidence of flooding	(see above)
Native cover	70 percent – herbs* 70 percent – shrubs and trees*
7. Export of organic carbon	
Evidence of flooding	(see above)
Litter	75 percent*
Course woody debris	75 percent*
BIOLOGICAL	
8. Vegetative Cover	See Section IX.B
9. Bird Count	50 percent *

*Relative to on-site reference areas

2. Biogeochemical

Since created/enhanced drainages will lack vegetation needed to conduct a biogeochemical assessment, success criteria for this assessment will only apply to SWS and BS creation areas. Target native cover (including vegetation in the tree, shrub, and herb layers) for this project is at least 70 percent of that measured at a reference site (Table 10). In addition, target detrital and soil organic matter will be at least 50 percent of that documented at a reference site. Removal of elements and compounds shall be measured by evidence of flooding, as observed by the presence of at least 2 of the following: water marks, silt lines, drift and/or wrack lines, sediment scour, or deposition. Retention of particulates shall also be measured by evidence of flooding, in addition to herbaceous cover of at least 70 percent of that noted within a reference site, and combined shrub and tree cover of at least 70 percent of that in a reference site. Export of organic carbon

also includes evidence of flooding, as well as visual estimates of litter and course woody debris at levels comparable to at least 75 percent of that in a reference site.

3. Biological

The successful development of vegetative cover will be assessed as outlined in Section IX.B., above. The target number of avian species observed within created riparian habitat is 50 percent of that observed within the selected on-site reference site(s; Table 10).

D. IRRIGATION CRITERION

To demonstrate that established vegetation is self-sustaining, all artificial water supply will be off for at least 2 years prior to project sign off.

X. COMPLETION OF MITIGATION

A. NOTIFICATION OF COMPLETION

The Corps and RWQCB will be notified of completion of the restoration/mitigation effort through submittal of a final (Year 5) monitoring report.

B. CONFIRMATION

If the project meets all success standards at the end of the 5-year monitoring period or sooner, then the mitigation will be considered a success; if not, the maintenance and monitoring program will be extended 1 year at a time until the standards are met. Specific remedial measures (approved by the Corps and RWQCB) will be used during any extension. Monitoring extensions will be done only for areas that fail to meet final success criteria. This process will continue until all Year 5 standards are attained or until the Corps and RWQCB determine that other mitigation measures are appropriate. Should the mitigation effort meet all goals prior to the end of the 5-year monitoring period, the Corps and RWQCB, at their discretion, may terminate the monitoring effort. If requested, a site visit may be conducted with the Corps and RWQCB to verify site conditions.

XI. CONTINGENCY MEASURES

A. INITIATING PROCEDURES

If the mitigation effort is not meeting success standards for the project, the project proponent shall notify the Corps and RWQCB and propose corrective measures.

B. ALTERNATIVE LOCATIONS FOR CONTINGENCY MITIGATION

If the success criteria are not being met on site, the Corps and RWQCB will work together with the permittee(s) to reach an alternative, mutually acceptable solution.

HELIX

XII. CERTIFICATION/QUALIFICATION

The following individuals contributed to the fieldwork and/or preparation of this report.

Katherine Fuller	M.A., Geography, San Diego State University, 2006 B.A., Geography and Environmental Studies, University of Oregon, 2003
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